Finality of Restriction Requirement

Examiner has made the Restriction Requirement final. Notwithstanding Examiner's determination of finality, Applicants request rejoinder of claims of Group II should the claims of Group I are found to be allowable. The law is clear that where product claims and a process of using the product claims are presented in the same application, rejoinder of the process of using the product claims is permitted when the product claim is found allowable. See M.P.E.P. §821.04; *In re Brouwer*, 37 USPQ2d 1663 (Fed. Cir. 1996); *In re Ochiai*, 37 USPQ2d 1127 (Fed. Cir. 1995). Thus, when composition claims of Group I are found to be allowable, Applicants request rejoinder of the process for using the composition claims, represented by claims of Group II.

Rejection under 35 U.S.C. §102(b)

Claims 1, 2, 4-8 and 12 are rejected under 35 U.S.C. §102(b) as allegedly being anticipated by U.S. Patent No. 4,003,870, issued to Gibson et al. (the "Gibson et al. patent"). In particular, the Examiner alleges "the paint compositions [disclosed in the Gibson et al. patent] are inherently useful for the intended purpose of coating a photoresist composition to provide a vertical photoresist pattern." See item 6 on page 3 of the Office Action.

The present invention is directed to over-coating compositions that are useful in producing a vertical photoresist pattern. Compositions of the present invention comprise an over-coating resin which is produced from a mixture of acrylic acid and an alkyl acrylate.

In contrast, compositions discussed in the Gibson et al. patent are directed to controlling the rheology of an aqueous latex paint. See, for example, Col. 1, lines 21-22. ("We are concerned in this invention...not with the...formulation of an aqueous latex paint, but with the control of its rheology."). Thus, compositions discussed in the Gibson et al. patent is added to aqueous latex-paint to increase its viscosity. See, for example, Col. 1, line 66, to Col. 2, line 2. More significantly, compositions discussed in the Gibson et al. patent is a copolymer of poly(ethylene glycol)acrylate or methacrylate and

methyl acrylate or methacrylate. See, for example, Col. 2, lines 3-7. Thus, compositions discussed in the Gibson et al. require the presence of poly(ethylene glycol)acrylate or poly(ethylene glycol)methacrylate. In addition, "the poly(ethylene glycol) must have a molecular weight of 500-1500...." See Col. 2, lines 8-9. Furthermore, copolymer must not include acrylic acid or methacrylic acid. See Col. 2, lines 23-26.

Unlike the compositions discussed in the Gibson et al. patent, the over-coat resins claimed in the present invention do not have poly(ethylene glycol) acrylate or poly(ethylene glycol)methacrylate. Moreover, over-coat resins of the present invention comprise acrylic acid which is explicitly excluded in the compositions discussed in the Gibson et al. patent. Since there is no "poly(ethylene glycol) acrylate or methacrylate" present in the over-coat resins of the present invention, it is submitted that the rejections under 35 U.S.C. §102(b) based on the Gibson et al. patent is improper. Accordingly, Applicants respectfully request withdrawal of the rejections under 35 U.S.C. §102(b).

Rejection under 35 U.S.C. §112

Claims 1-13 are rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite. In particular, the Examiner alleges the terms "basic" and "salt" are confusing because the term "basic compound" does not cover "hydroxy salts" and the term "salt" does not include tetralkylammonium hydroxides. See item 9 bridging pages 4-5 of the Office Action.

It is noted that all that the patent laws require is that the claims be sufficiently clear that those skilled in the art are able to determine whether a compound of interest is (or is not) within the scope of the claims. *In re Mercier*, 185 U.S.P.Q. 774 (C.C.P.A. 1975) (claims sufficiently define an invention so long as one of ordinary skill can determine what subject matter is or is not within the scope of the claims). The present claims comply with this standard.

As shown on pages 20 and 21 of a general chemistry textbook entitled "Chemical Principles, 3rd Ed.", which is enclosed herein as Exhibit A, the term "salt" refers to "a compound made up of positive and negative ions." The definition of "salt" is

further defined to include "compound or **complex ions**...**formed between** a metal or **nonmetal** and...**ammonia**...the **hydroxide ion**...or other chemical groups." (Emphasis added). See the last paragraph on page 20. Moreover, Table 1-5 shown on page 21 clearly lists ammonium ion and hydroxide ion as representatives of common complex ions that form a salt. Thus, the term "salt" clearly includes hydroxide (or hydroxy) salts of ammonium or a corresponding tetraalkylammonium cation. Therefore, it is submitted that the term "hydroxy salt" is not confusing and is clearly within the definition of "salt" as defined by one skilled in the art.

More significantly, in rejecting the claims under 35 U.S.C. §102(a) as allegedly being anticipated by the Tanabe et al. patent (see below), the Examiner uses the term "salt" to describe the product of a reaction between perfluorooctylsulfonic acid and monoethanolamine. Thus, the Examiner's assertion that the term "salt" is confusing, and thus indefinite, is contradicted by Examiner's own use of the term "salt" in describing the product of an acid-base reaction.

The Examiner alleges the term "basic compound" is unclear because of the use of the term "hydroxy salt." As discussed above, the term "hydroxy salt" is sufficiently clear to those skilled in the art such that the scope of the claims can be readily determined. Therefore, it is submitted that the term "basic compound" is also sufficiently clear to one skilled in the art. In general, a base refers to a compound that donates an electron pair (i.e., Lewis base) or a compound that has increases the hydroxide ion concentration when added to water. See page 64 of a general chemistry textbook entitled "Chemical Principles, 3rd Ed.", which is enclosed herein as Exhibit B. Again, Examiner's own use of the term "basic compound" to describe monoethanol amine in item 14, on page 6 of the Office Action, contradicts the Examiner's assertion that the term "basic compound" is indefinite.

Since the terms "basic compound" and "salt" are sufficiently clear to those skilled in the art, Applicants respectfully request withdrawal of the rejections under 35 U.S.C. §112, second paragraph.

Rejection under 35 U.S.C. §102(a)

Claims 1, 2, 4-8, 12 and 13 are rejected under 35 U.S.C. §102(a) as allegedly being anticipated by U.S. Patent No. 6,132,928, issued to Tanabe et al. (the "Tanabe et al. patent"). In particular, the Examiner alleges "the paint compositions [disclosed in the Gibson et al. patent] are inherently useful for the intended purpose of coating a photoresist composition to provide a vertical photoresist pattern." See item 6 on page 3 of the Office Action.

The compositions discussed in Examples 1 and 2 of the Tanabe et al. patent require a fluorinated surfactant, such as perfluorooctylsulfonic acid, and an N-alkyl-2-pyrrolidone, such as N-octyl pyrrolidone. Moreover, the polymer in Example 1 of the Tanabe et al. patent is polyacrylic acid, whereas the over-coating resin of the present invention is derived from a mixture of acrylic acid and an alkyl acrylate. As for Example 2 of the Tanabe et al. patent, the polymer used is polyvinyl pyrrolidone **not** polyacrylic acid. ("in the same manner as in Example 1 except for using...polyvinyl pyrrolidone as a substitute for...polyacrylic acid.") See Col. 6, lines 28-32.

Moreover, the objective of the Tanabe et al. patent is to provide a coating solution for forming a uniform antireflective coating (ARC) film, thereby providing an anti-reflective property and a smooth top surface, even in a small application dose. See, for example, Col. 7, lines 14-18.

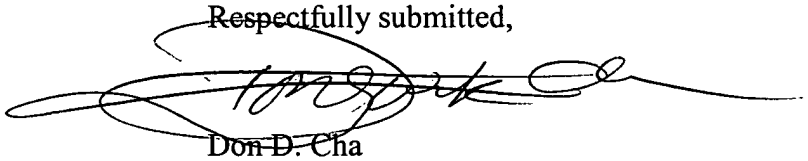
In contrast, compositions of the present invention are not directed to an ARC solution but rather to an over-coating composition for protecting the PR film from amine contamination. Thus, the over-coating compositions of the present invention do not contain an anti-reflective component, while the ARC solution discussed in the Tanabe et al. patent requires a fluorinated surfactant to achieve an anti-interference effect. See, for example, Col. 3, lines 40-41. Furthermore, as the Examiner acknowledges, monoethanol ammonium perfluorooctylsulfonate salt that is listed as a preferred example of the fluorinated surfactant is weakly acidic not basic.

Since every element as set forth in the claim is **not** found in the Tanabe et al. patent, the rejection under 35 U.S.C. § 102(a) is improper. Accordingly, Applicants respectfully request withdrawal of the rejections under 35 U.S.C. § 102(a).

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance and an action to that end is urged. If the Examiner believes a telephone conference would aid in the prosecution of this case in any way, please call the undersigned at 303-571-4000.

Respectfully submitted,



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APPENDIX A
VERSION WITH MARKINGS TO SHOW CHANGES MADE

Claims 1, 6 and 14 have been amended as follows.

1. (Amended Herein) An over-coating composition for coating a photoresist composition to provide a vertical photoresist pattern, said over-coating composition comprising an over-coating resin derived from **a mixture of** acrylic acid~~,~~ **and an** alkyl acrylate, ~~**or a mixture thereof,**~~ a solvent, and a basic compound.

6. (Amended Herein) The over-coating composition according to Claim 1, wherein said basic compound is selected from the group consisting of an amine compound and a ~~**hydroxy**~~ **hydroxide** salt thereof; an amide compound; a urethane compound; and a mixture thereof.

14. (Amended Herein) A process for forming a photoresist pattern, comprising the steps of:

(a) coating a photoresist composition on a substrate to form a photoresist film;

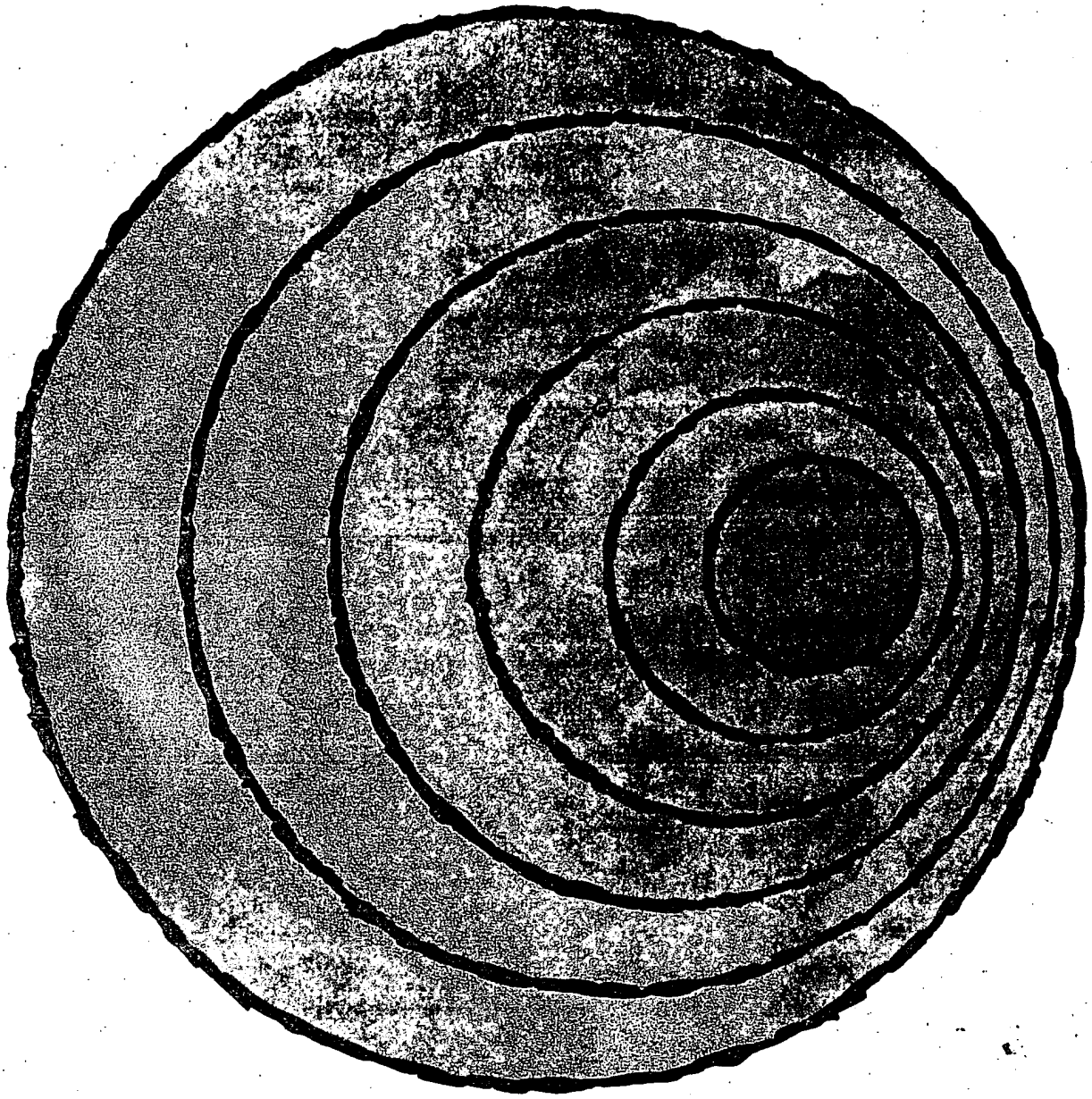
(b) coating an over-coating composition on the upper portion of said photoresist film to form a over-coating, wherein said over-coating composition comprises an over-coating resin **derived from a mixture of acrylic acid and an alkyl acrylate**, a solvent, and a basic compound;

(c) exposing said over-coated substrate to light using a light source; and

(d) developing said exposed over-coated substrate.

Exhibit A

DICKERSON
GRAY
HAIGHT



CHEMICAL PRINCIPLES

THIRD EDITION

Chemical Principles

Third Edition

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Example 13

When metals are converted into their ions, are they oxidized or reduced? What is the oxidation state of the aluminum ion?

Solution

Metals are oxidized to their ions, since electrons are removed. The aluminum ion, Al^{3+}, is in the $+3$ oxidation state.

If two or more oxidation states for a metal ion are possible, they are differentiated by writing the oxidation state in Roman numerals after the name of the atom. An older nomenclature, still in use, identifies the higher oxidation state by the ending *-ic* and the lower by *-ous*. Hence,

Fe^{2+}	iron(II) or ferrous	Fe^{3+}	iron(III) or ferric
Cu^{+}	copper(I) or cuprous	Cu^{2+}	copper(II) or cupric
Sn^{2+}	tin(II) or stannous	Sn^{4+}	tin(IV) or stannic

Example 14

When the ferric ion is converted to the ferrous ion, is this an oxidation or reduction? Write the equation for the process.

Solution

The equation is $Fe^{3+} + e^{-} \rightarrow Fe^{2+}$. The process is a reduction since an electron is added.

The modern nomenclature with Roman numerals is easier to use because it does not require you to remember what the two oxidation states of a metal are, in order to know what a compound is from its name.

A salt is a compound made up of positive and negative ions. Because a salt must be electrically neutral, the total charge on its positive and negative ions must be zero. Since each ion of Sn^{2+} has a charge of $+2$, twice as many chloride ions with -1 charge each are required to produce a zero net charge. Hence the salt of Sn^{2+} and Cl^{-} ions has the overall composition $SnCl_2$, rather than SnCl or $SnCl_3$. It is called stannous chloride or tin(II) chloride. The formula for stannic chloride or tin(IV) chloride is $SnCl_4$.

In addition to these simple ions, compound or complex ions can be formed between a metal or nonmetal and oxygen, chlorine, ammonia (NH_3), the hydroxide ion (OH^{-}), or other chemical groups. The sulfate ion, SO_4^{2-}, has four oxygens at the corners of a tetrahedron around the central sulfur atom, and an overall charge of -2. The nitrate ion, NO_3^{-}, has three oxygen atoms in an equilateral triangle around the nitrogen, and a -1 charge. The ammonium ion, NH_4^{+}, has four hydrogens at the corners of a tetrahedron, and a $+1$ charge. These ions are thought of as units because they form salts

Table 1-5

Some Common Complex Ions

Cations			Anions			
+1	+2	+3	−4	−3	−2	−1
NH_4^+ Ammonium	$Cu(NH_3)_4^{2+}$ Tetraammine-copper(II)	$Co(NH_3)_6^{3+}$ Hexaammine-cobalt(III)	$Fe(CN)_6^{4-}$ Hexacyano-ferrate(II) (ferrocyanide)	PO_4^{3-} Phosphate	CO_3^{2-} Carbonate	OH^- Hydroxide
$Ag(NH_3)_2^+$ Diammine-silver(I)	VO^{2+} Vanadyl			AsO_4^{3-} Arsenate	SO_4^{2-} Sulfate	NO_3^- Nitrate
$(CH_3)_4N^+$ Tetramethyl-ammonium	UO_2^{2+} Uranyl			AsO_3^{3-} Arsenite	SO_3^{2-} Sulfite	NO_2^- Nitrite
NO^+ Nitrosyl	$Ni(NH_3)_6^{2+}$ Hexaammine-nickel(II)			BO_3^{3-} Borate	CrO_4^{2-} Chromate	BF_4^- Fluoroborate
NO_2^+ Nitryl				$Fe(CN)_6^{3-}$ Hexacyano-ferrate(III) (ferricyanide)	$Cr_2O_7^{2-}$ Dichromate	CN^- Cyanide
					$C_2O_4^{2-}$ Oxalate	ClO^- Hypochlorite
					$S_2O_3^{2-}$ Thiosulfate	ClO_2^- Chlorite
					$PtCl_4^{2-}$ Tetrachloro-platinate(II)	ClO_3^- Chlorate
					$PtCl_6^{2-}$ Chloroplatinate or hexachloro-platinate(IV)	ClO_4^- Perchlorate
						BrO_3^- Bromate
						IO_3^- Iodate
						MnO_4^- Perman-ganate
						SCN^- Thiocyanate
						$C_2H_3O_2^-$ Acetate
						I_3^- Triiodide

the way single-atom ions do, and go through many chemical reactions unchanged. Silver nitrate, $AgNO_3$, is a salt containing equal numbers of Ag^+ and NO_3^- ions. Ammonium sulfate is a salt with twice as many ammonium ions, NH_4^+, as sulfate ions, SO_4^{2-}, and the chemical formula $(NH_4)_2SO_4$. Other typical complex ions are shown in Table 1-5.

Exhibit B

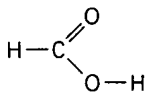
Acid–Base Neutralization

Probably the most familiar definition of acids and bases is that by the Swedish physicist and chemist Svante Arrhenius (1859–1927): An **acid** is a substance that increases the hydrogen ion concentration, $[H^+]$, when added to water, and a **base** is a substance that increases the hydroxide ion concentration, $[OH^-]$, when added to water. Some of the more common acids and bases are listed in Tables 2-1 and 2-2. The first 11 acids in Table 2-1, from HF to HNO_3, dissociate in aqueous solution to release one proton or hydrogen ion:

$$\underset{\text{nitric acid}}{HNO_3} \rightarrow H^+(aq) + \underset{\text{nitrate ion}}{NO_3^-}(aq)$$

Table 2-1

Common Acids

HF	Hydrofluoric
HCl	Hydrochloric
HClO	Hypochlorous
$HClO_2$	Chlorous
$HClO_3$	Chloric
$HClO_4$	Perchloric
HBr	Hydrobromic
$HBrO_3$	Bromic
HI	Hydriodic
HNO_2	Nitrous
HNO_3	Nitric
H_2CO_3	Carbonic
H_2SO_3	Sulfurous
H_2SO_4	Sulfuric
H_3PO_2	Hypophosphorous
H_3PO_3	Phosphorous
H_3PO_4	Phosphoric
H_3BO_3	Boric
HCOOH	Formic. 
CH_3COOH	Acetic.